3.—WEST AUSTRALIAN MYDAIDAE (*DIPTERA*).*

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CONTENTS.

The Australian species of the family *Mydaidae* were treated by Hardy (*Proc. Linn. Soc., N.S.W.*, 1925, page 140), and corrections and new species were subsequently added by I. M. Mackerras (*Proc. Linn. Soc., N.S.W.*, 1928, page 539). The latter paper also contains a very useful key to the species. The purpose of the present paper is to provide additional notes on the Western Australian forms, adding one new species.

The writer is indebted to Mr. L. Glauert, Curator of Perth Museum, and to Mr. L. J. Newman, Government Entomologist, W.A., for the loan of some of the material studied. His thanks are also due to Dr. I. M. Mackerras, and to Mr. K. E. W. Salter, of the Macleay Museum, for help in comparing material.

Wing-venation.—Tillyard (Insects of Australia and New Zealand, 1926) labels the vein arising from the median cell of *Miltinus* as M1 + 2, assuming that the single vein represents a coalescence of the first and second median veins. This is one of two possible assumptions that can be made as to the correct notation of the vein in this genus. The other possibility is that the first median vein only is represented, the second having disappeared in the wing-membrane separately from M1.

That the latter view is more likely to be correct was suggested by an examination of the wings of a series of specimens of both sexes of *Miltinus minutus* Mackerras, captured near Fremantle. Six of the twenty-eight specimens in this series have a vestige of M2 arising from the base of M1 (Plate 1, Fig. A). There cannot be much doubt that this is an atavistic character in these specimens. The existence of a stump of M2 in such a position indicates that the vein in question disappeared separately in the wing-membrane and that the remaining vein is more correctly to be labelled M1 than M1 + 2.

Some specimens of this and other species show a distinct tendency for M1 to become very thin, indicating that this vein may be tending to undergo obliteration as M2 has done.

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Specific Characters.—Descriptions based on colour alone may cause considerable trouble, owing to the fact that *Mydaidae*, especially the females, are very apt to become greasy after some time in collections. Mackerras pointed out the value of the proportions of the antennal segments in taxonomy, this character being of considerable value in the grouping of species, but of little use within the groups so formed.

The male terminalia of most of the species examined in this paper are recognisably different from one another, but the distinctions are difficult to illustrate or describe accurately.

Key to Genera of Australian Mydaidae.

Veins M1 and M2 both present in Wing—*Diochlistus* Gerstaecker;
M1 alone present in Wing— *Miltinus* Gerstaecker.

Diochlistus mitis, Gerstaecker.

1 male, Canning Bridge, W.A., November, O'Connor.
1 male, Gnangara, W.A., November, Perry.
10 males, 4 females, Applecross, W.A., September and October, 1934, K. R. Norris.

The specimens collected by the writer were taken flying around in open jarrah forest country, often resting on bare sandy patches. The species was quite common in the locality.

Miltinus stenogaster, Westwood.

1 male, Cunderdin, W.A.
1 male, Cottesloe, W.A.
1 male, January, 1 female, December, Swan River, W.A., L. J. Newman.
1 female, Gnangara, W.A., November, O'Connor.
6 males, 2 females, Fremantle, W.A., November, 1934, K. R. Norris.

This species is fairly commonly taken resting on sandy patches of ground in the Fremantle district, even on vacant allotments in the town.

One specimen in the Perth Museum collection is mounted on the same pin as a species of *Mantispidae* to indicate that the fly was taken with the lacewing as prey.

Miltinus musgravei, Mackerras.

7 males, 3 females, Rottnest Island, W.A., L. Glauert.
2 males, Rottnest Island, W.A., March, D. Swan.
1 male, Naval Base (near Fremantle), December, L. J. Newman.
1 female, Swan River, W.A., December, L. J. Newman.

In the female, which is rather more different from the male than described by Mackerras, there are only three pairs of creamy white spots on the abdominal terga, situated on tergites 2-4, whilst segments 5-7 lack them. These three apical segments are mostly brown, but the fifth tergite, and to a lesser degree the sixth, is blackish posteriorly and laterally. Tergites 2-4 have each a pair of inwardly-pointing, light brown wedges anterior to and lateral to the paired creamy spots.

Mr. L. Glauert has during the past few years collected a series of this species on Rottnest Island, where the flies occur in summer visiting flowering teatree. Mr. Glauert states that the female in flight carries the abdomen bent downward at the tip, and strongly resembles a male Thynnid wasp

carrying the female, the brown colouring of the apex of the abdomen heightening the resemblance. Such a species of wasp occurs on the island at the same season as the flies.

Miltinus maculpennis, Westwood.

1 male, Kelmscott, W.A., 1st January, 1936, K. R. Norris.
1 pair taken in copula, Crawley, W.A., 28th December, 1935, K. R. Norris.

The male from Kelmscott was secured on an open sandy block of ground with sparse vegetation. The pair taken in copula was flying around in long grass in the grounds of the Biology Department of the University at Crawley.

The extent of the black colouration at the tip of the abdomen differs in the two male specimens. In one case the fifth tergite has a transverse black band near the anterior edge, whilst the sixth tergite has a narrow orange band along the posterior edge. The other specimen has the fifth tergite almost completely orange, except for a narrow central black stripe, whilst tergite 6 is completely black. Tergites 2-5 have each a central black mark which shows some variation in the extent of its development. The female specimen has tergites 5-7 of the abdomen completely black.

Miltinus minutus, Mackerras (Plate 1A).

1 female, Garden Island, W.A., 23rd February, 1935, K. R. Norris.
12 females, 15 males, Applecross (near Fremantle), W.A., January, February, 1935-36-37, K. R. Norris.

This species is frequently to be taken perching on bare sandy patches, like other *Mydaidae*, but has also been captured on several occasions whilst visiting the flowers of pink myrtle, *Hypocalymma robusta*.

The series studied shows an interesting range of variation.

The males vary widely in the stoutness of the build of the body. A specimen 12mm. in length is much more slender in thorax and abdomen than another specimen 10mm. in length from the same locality. The terminalia of the stout specimen are larger and more bulbous than those of the slenderer forms and differ in the shape of the forceps, these being much longer in the slenderer forms. The hind femora in the short, stout male are strongly incrassate. The tibiae are markedly curved, and carinate on the surface fitting against the femur, and with a strong apical tooth. In the slenderer specimens the hind femora vary to a form showing very little thickening, the tibiae being not so strongly curved, only slightly carinate, and with the apical tooth not so pronounced.

In the stout specimens the head is noticeably larger in proportion to the size of the body, and the labella of the proboscis are larger.

The females show a parallel variation in head characters, body stoutness, and condition of hind legs. There is also a wide variation in the degree of infuscation of the wings. Whereas some specimens are quite heavily marked with brown (fading out posteriorly and distally), there is a distinct gradation to forms in which the wings are almost as clear as in the male.

Differences in wing-venation have been dealt with in another section.

The variations described above show a gradation to the condition of the various structures of *Miltinus mackerrasi* sp. nov., to which this species was at first thought to be closely related, though it is now considered that the resemblance is purely superficial.

Miltinus, sp. (?).

A much damaged specimen from the collection of the Perth Museum belongs apparently to an undescribed species placed in the section of genus *Miltinus* separated by Mackerras by the fact of the third segment of the antennae being little more than twice the length of the first two together. The wings are clear. Antennae, legs, thorax and base of abdomen orange; terminal five segments of abdomen mostly brown.

The specimen is a female from Dumbleyung, W.A., and the material is insufficient for the preparation of a formal description.

Miltinus mackerrasi sp. nov. (Plate 1, B-F).

A very small slender blackish species with hyaline wings in both sexes, unthickened hind femora, and very short proboscis.

Measurement.—Male: Body (excl. head) 10mm., wing 6mm. Female: Body 12.5mm., wing 7.5mm.

Male.—Head (Plate 1, C): Ground colour black. Head-capsule very concave posteriorly, where it is completely dusted with silvery shite. Bristles black near hinder margin of eyes, but white on rest of posterior aspect of head.

Ocellar tubercle black, bare and shining, flanked on either side by a black patch which separates the white dusting on the back of the head from the white pulverulence above antennal level laterally. Each of these black patches bears a tuft of erect, inwardly-directed brownish hairs.

Below ocellar tubercle is a prominent black bulge, bare and shining, on the lower edge of which the antennae are inserted. The space between the lateral edges of this bulge and the eye-margin has a dense whitish pulverulence, which fades out towards the antennal bases. A tuft of very light brownish hairs flanks the antennae on either side.

The facial knob below antennae is shining black centrally, dusted with white laterally, and bears a dense moustache of hairs which are black centrally, changing in colour to brownish-white laterally.

Antennae dark brown. Proportions of segments (from base outwards) 14 : 7.3 : 30 :40. Basal segment with a slight white dusting and a few blackish bristles. Second segment with a few shorter bristles. Terminal segment dilated, dark brown above, light yellowish-brown below.

Proboscis brown, very short and fleshy, not projecting beyond epistome. Labella very broad but flattened, comprising by far the greater part of proboscis. Palpi and maxillae very minute—usually only visible in preparations.

Thorax: slenderly built, ground colour very deep brown. With a complete faint dusting of silvery white.

Prothorax deeply constricted off from mesothorax and forming a long neck to the head which is extremely mobile.

Scutum with a faint, slender, median, white vitta fading out posteriorly. A pair of prominent white stripes flank this, broadening outwards anteriorly near the spiracular prominence. Lateral edges of scutum with a broad band of white dusting. The scutum has a coating of short brown hairs, most easily seen in greasy specimens.

Pleura for the most part bare, but with a few white hairs on prothorax.

Sterna bare.

Wings (Plate 1B) hyaline. Veins dark brown. Anal cell open at margin. There are minor variations in wing-venation. The most important variation which occurs only in isolated specimens, is the formation of a small closed cell at the distal end of the median cell, by a brief fusion of veins M1+2 and M3+4 basad to the intermedian crossvein.

Legs dark brown. Hind femora not at all thickened. Hind tibiae straight.

Abdomen: Ground colour very dark brown. Anterior edge of each tergite with a complete transverse band of white dusting the width of which is equal to about one-fifth of the length of the tergite. This dusting, like most of the other white markings is only visible when the insect is viewed from certain angles. Eighth tergite a very narrow transverse strip, concealed beneath seventh.

Terminalia: (Plate 1D). The terminalia of the male are quite small and both pairs of forceps, particularly the lower, point upwards. Upper forceps with the blades very broad basally, strongly incurved and tapering at the tips where each bears a tuft of two or three truncated peg-like black spines (visible in preparations). Lower forceps paler in colour and with an abruptly tapered piece apically. Aedeagus simple, upwardly curved. Eighth sternite and forceps with short black bristles.

Female: Differs from male in being larger and in having a stouter abdomen.

Proportions of head-capsule taking head-width as standard:—

	Male (average of 5 specimens).	Female (average of 5 specimens).
Head width	100	100
Head height	67·5	70·5
Head length	50·5	47·5
Separation of eyes	32·5	36
Antenna length	61	66·5
Proboscis length	27	29·5

Variations: The variation in the series studied is very small. There are minor differences in the shapes of the cells in the wings and the vestiture of the vertex varies a little in colour.

Types: The type specimens will be placed in the Perth Museum.

Affinities: None of the described species appears to be closely related to this form.

Biological and Ecological Notes:—

The species is common from January to March about the Biology Buildings of the University at Crawley, and odd females have been collected south of Fremantle, and at Applecross, a few miles east of Fremantle.

On hot, still days dozens of specimens may be seen in the grounds of the Biology Buildings, where the males frequent the sunlit walls, tree-trunks, picket fences, and even the top of a packing case standing in the open. Curiously enough the males are seldom seen upon the ground, the usual habitat for Mydaids. Females are evidently much fewer in numbers than males, and usually inhabit the ground.

When the temperature is high the males are very active and may be seen hovering rapidly up and down the surface of tree trunks and walls. Every newcomer to a favourable situation is immediately investigated by the flies already there, and many cases have been observed of males attempting to pair with other males. Pairing takes places quite readily in captivity.

No evidence has been secured as to feeding habits. The mouth parts are never smeared with pollen as is often the case with *Apioceridae*. Dissected specimens have been found with colourless transparent fluid filling the food reservoir.

Occasionally specimens fall victims to the small jumping spiders which frequent the walls.

A curious feature of the external anatomy of this species is that the dorsal surface of the neck-membrane protrudes as a small, reddish vesicle. This can sometimes be seen to pulsate actively when the insect is given warmth and light, and as the movements are synchronised with the respiratory movements of the abdomen, presumably the sac contains a diverticulum of the respiratory system. The pulsation is very rapid but does not occur continuously. Other Mydaid species examined have a similar bulge in the dorsal neck membrane.

The abundance of material available has made it possible to conduct an investigation into the internal anatomy, on which the writer hopes to publish some notes in a subsequent paper.

The species is named in honour of Dr. I. M. Mackerras.

Note on Life History: Early in February 1936 a male and female were placed together in a glass vessel and were observed to pair several times. After an interval of about two days the female laid three eggs, which were rather football-shaped and dull yellow in colour (1.34mm. x 0.52mm.). A fortnight later these eggs hatched, disclosing three slender shining white larvae, one of which was preserved. The other two were placed in a petri-dish with sand and some wood debris. Some days later only one larva could be recovered, indicating a possible case of cannibalism.

A week after hatching the remaining larva was seen to be undergoing ecdysis, the process taking several days before completion.

The larva was given a broken egg of a phasmid (*Podacanthus sp.*) to feed upon, and was seen to bury its head in the yolk, which was later visible filling the alimentary canal. Unfortunately the larva did not survive until the third instar, the diet provided no doubt proving unsuitable.

First instar larva: (Plate 1 fig. E). Length 2.5mm. Differs from second instar chiefly in character of head capsule, which is larger in proportion to the body, different in shape and less strongly sclerotised.

Second instar larva: (Plate 1 fig. F). Length 3.3mm. Shining and creamy white in colour. Body roughly cylindrical, but rather flattened ventrally.

Head capsule with a few weak bristles. Details of mouthparts unfortunately not determinable.

Thoracic segments each bearing a pair of slender bristles ventrally. The abdominal segments bear laterally a slightly projecting flange, which rather breaks the cylindrical contour of the body. This flange is divided up into three slight lobes in each segment.

Body segments 5-9 each have a transverse row of four small pseudopods near the anterior edge of the ventral surface.

Terminal segment roughly conical, smoothly rounded apically, flattened ventrally. This segment has a very few weak bristles and bears the anus on the ventral surface.

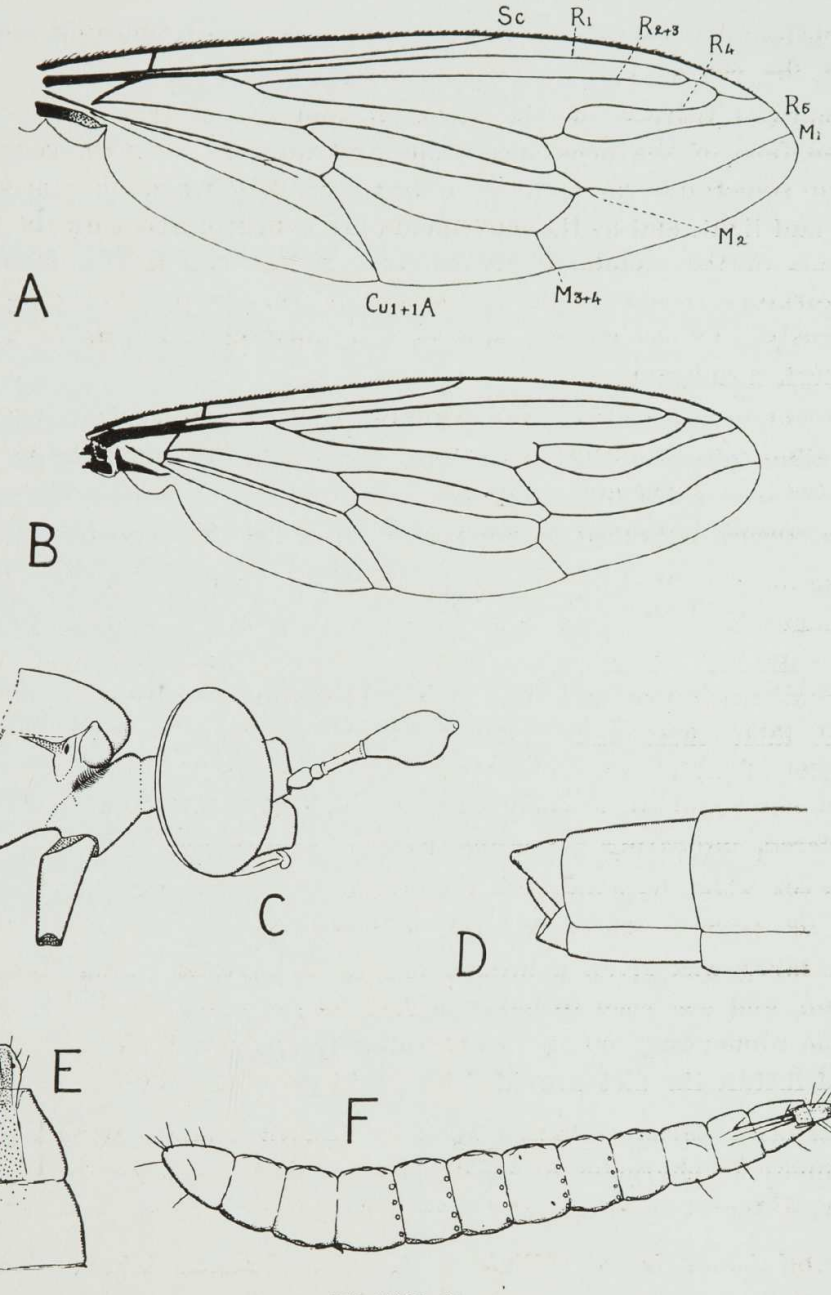

PLATE I.

A. Wing of **Miltinus minutus** Mackerras.
Figs. B–F. **Miltinus mackerrasi** sp. nov.
B. Wing.
C. Head and Prothorax.
D. Male terminalia.
E. Head and first two segments of 1st instar larva.
F. Second instar larva.